UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/616,842	07/10/2003	Lipeng Cao	SC12795TS	1718

23125   7590   06/25/2007
FREESCALE SEMICONDUCTOR, INC.
LAW DEPARTMENT
7700 WEST PARMER LANE MD:TX32/PL02
AUSTIN, TX 78729

EXAMINER
OCHOA, JUAN CARLOS

ART UNIT	PAPER NUMBER
2123	

MAIL DATE	DELIVERY MODE
06/25/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

PTOL-90A (Rev. 04/07)

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 April 2007*.

2a)☒ This action is **FINAL**.   2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-15 and 31-44* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *5,7-9,31-34,39 and 40* is/are allowed.

6)☒ Claim(s) *1-4,6,10-15,35-38 and 41-44* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)
2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.
5)☐ Notice of Informal Patent Application
6)☐ Other: _____.

DETAILED ACTION

1.   The amendment filed 4/13/07 has been received and considered. Claims 1–15

and 31–44 are pending in this application, claims 16–30 have been cancelled. Claims

1–15 and 31–44 are presented for examination.

Claim Rejections - 35 USC § 103

2.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3.   The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

4.   Claims 1–3, 12, 14, 15, and 35 are rejected under 35 U.S.C. 103(a) as being

unpatentable over Uchino, (Uchino hereinafter), U.S. Patent 7,076,405, taken in view of

Macii et al., (Macii hereinafter), Stream Synthesis For Efficient Power Simulation Based

On Spectral Transforms.

5.   As to claim 1, Uchino discloses a method of deriving a power transfer function

(see col. 3, lines 38–41) of a circuit, the method comprising: grouping the plurality of

inputs into groups of at least one input based on a commonality (see "groups of the

primary inputs in order that the primary inputs having correlations to each other belong

to the same group" col. 10, lines 44–50); and providing an estimate of power

consumption of the circuit responsive to signals applied to the plurality of inputs of the

circuit, wherein the transfer function includes a portion for each group of the groups (see

col. 3, line 65 to col. 4, line 17).

6.   While Uchino discloses grouping the plurality of inputs into groups of at least one

input based on a commonality and providing an estimate of power consumption of the

circuit responsive to signals applied to the plurality of inputs of the circuit, wherein the

transfer function includes a portion for each group of the groups; Uchino fails to disclose

running at least one test on a circuit having a plurality of inputs to obtain information on

power consumption of the circuit responsive to signals applied to the plurality of inputs,

fails to expressly disclose grouping based on a commonality of power consumption of

the circuit for the plurality of inputs as determined from the information, and fails to

disclose deriving a power transfer function.

7.   Macii discloses running at least one test on a circuit having a plurality of inputs to

obtain information on power consumption of the circuit responsive to signals applied to

the plurality of inputs (see page 417, col. 2, next to last paragraph, lines 3–6); grouping

the plurality of inputs based on a commonality of power consumption of the circuit for

the plurality of inputs as determined from the information (see "grouping the plurality of

inputs" as "identifying the components of the original stream" and "based on a

commonality of power consumption ... for the plurality of inputs" as "that are most

relevant in characterizing average power consumption" and "spatio–temporal and transition correlations captured from the original sequence" in page 417, col. 2, next to last paragraph, lines 1–3 and 7–10); deriving a power transfer function (see "power transfer function" as "input switching function" in page 419, col. 1, 3rd paragraph, lines 3–6).

8.   Uchino and Macii are analogous art because they are both related to estimating power consumption.

9.   Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to utilize the steps of Macii in the method of Uchino because Macii minimizes the time required to perform simulation-based power estimation by reducing the length of the input trace to be fed to the simulator (see page 417, col. 1, lines 1–3), and as a result, Macii reports the following improvements over his prior art: synthesizing short streams of patterns that can be used for power simulation instead of the long input traces usually determined by the designers through architectural, behavioral, or system-level simulation. His method uses spectral information (in addition to the usual correlation measures) collected on the given sequence to properly form a reduced stream which guarantees a large speed-up in the simulation time at the price of a very low average power estimation error, and thus generates reduced streams for a large variety of original input traces (see page 426, col. 1, Conclusion).

10.   As to claim 2, Macii discloses a method wherein the grouping comprises: deriving at least one coherency for each input of the plurality with respect to power consumption

based on the information (see page 420, col. 2, paragraphs 2 and 3) and clustering the coherencies to identify the groups (see page 420, col. 2, last paragraph, lines 1–7).

11.   As to claim 3, deriving at least one coherency further includes: deriving, for each input of the plurality and for each test of the at least one test an average squared coherency (manipulation of mathematical concepts) wherein the clustering the coherencies further includes clustering the average squared coherencies (manipulation of mathematical concepts).

12.   As to claims 12 and 35, Macii discloses a method further comprising: simulating the circuit (see page 422, col. 1, next to last paragraph, lines 3–5); wherein the running at least one test on the circuit includes running the at least one test on the simulated circuit (see page 422, col. 2, 2nd paragraph).

13.   As to claim 14, Macii discloses a method wherein the deriving includes performing frequency domain analysis of the information (see page 417, col. 1, 2nd paragraph).

14.   As to claim 15, Macii discloses a method wherein the grouping includes performing frequency domain analysis of the information (see page 417, col. 1, 2nd paragraph).

15.   Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Uchino taken in view of Macii as applied to claim 2 above, and further in view of Welch, (Welch hereinafter), The Use Of Fast Fourier Transform For The Estimation Of Power Spectra: A Method Based On Time Averaging Over Short, Modified Periodograms.

16. As to claim 4, Macii discloses a method wherein the deriving at least one coherency further includes: taking a Fourier transform applied of each signal applied to each input of the plurality for each test of the at least one test (see page 419, col. 1, last paragraph, lines 9–13). A coherency of the at least one coherency for each test is derived from the Fourier transform of the signal applied to the input for that test and the Fourier transform of the power consumed for that test (manipulation of mathematical concepts).

17. While the Uchino–Macii method takes a Fourier transform applied of each signal applied to each input of the plurality for each test of the at least one test; the Uchino–Macii method lacks deriving at least one coherency further including: taking a Fourier transform applied of each signal applied to each input of the plurality for each test of the at least one test.

18. Welch discloses taking a Fourier transform of the power consumed for each test of the at least one test (see page 70, col. 2, lines 8–9).

19. Uchino, Macii, and Welch are analogous art because they are related to estimating power consumption.

20. Therefore, it would have been obvious to one of ordinary skill in this art at the time of invention by applicant to utilize the steps of Welch in the Uchino–Macii method because Welch outlines a method for the application of the fast Fourier transform algorithm to the estimation of power spectra, which involves sectioning the record, taking modified periodograms of these sections, and averaging these modified periodograms (see page 70, col. 1, Introduction, lines 1–6), and as a result, Welch

reports the following improvements over his prior art: fewer computations than other

methods, transformation of sequences which are shorter than the whole record, and a

potential resolution in the time dimension (see page 70, col. 1, Introduction, lines 6–12).

21.   Claims 10 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable

over Uchino taken in view of Macii as applied to claim 1 above, and further in view of

Joseph et al., (Joseph hereinafter), Run-Time Power Estimation in High Performance

Microprocessors (See IDS dated 7/10/03).

22.   As to claims 10 and 36, While the Uchino–Macii method derives a power transfer

function of a circuit; the Uchino–Macii method lacks implementing the power transfer

function in a second circuit wherein the second circuit includes inputs coupled to the

inputs of the circuit.

23.   Joseph discloses a method further comprising: implementing the power transfer

function in a second circuit wherein the second circuit includes inputs coupled to the

inputs of the circuit (see "run-time monitor" in page 135, col. 2, last paragraph, lines 1–

3).

24.   Uchino, Macii, and Joseph are analogous art because they are related to

estimating power consumption.

25.   Therefore, it would have been obvious to one of ordinary skill in this art at the

time of invention by applicant to utilize the steps of Joseph in the Uchino–Macii method

because Joseph examines the use of hardware performance counters as proxies for

power meters, discusses which performance counters count power-relevant events,

estimates event counts for power-relevant events not well supported by his prior art

(see page 135, col. 1, 2nd paragraph, lines 4–9), and as a result, Joseph reports the

following improvements over his prior art: instead of relying on simplified performance

simulations, programmers can evaluate the impact of their final optimizations on real

hardware (see page 136, col. 1, , lines 8–12) and applications in high performance

processors which exhibit complex energy usage patterns providing component power

consumption (see page 140, col. 1, , 2nd paragraph, lines 4–5).

Allowable Subject Matter

26.   Claims 5, 7–9, 31–34, 39, and 40 are allowed.

27.   Claims 6, 11, 13, 37, 38, and 41–44 are objected to as being dependent upon a

rejected base claim, but would be allowable if rewritten in independent form including all

of the limitations of the base claim and any intervening claims.

28.   The following is a statement of reasons for the indication of allowable subject

matter:

29.   While Uchino discloses a method of deriving a power transfer function (see col.

3, lines 38–41) of a circuit,

Macii minimizes the time required to perform simulation-based power estimation by

reducing the length of the input trace to be fed to the simulator (see page 417, col. 1,

lines 1–3),

Welch outlines a method for the application of the fast Fourier transform algorithm to the

estimation of power spectra, which involves sectioning the record, taking modified

periodograms of these sections, and averaging these modified periodograms (see page

70, col. 1, Introduction, lines 1–6),

and Joseph discloses deducing the actual runtime power dissipated by different

processor units on a CPU chip (see page 135, col. 1, 2nd paragraph, lines 1–4),

none of these references taken either alone or in combination disclose the following

limitations specifically including:

claim 5 "clustering in multi-dimensional space having a dimension for each test",

claim 6 "determining an accuracy of the transfer function and changing the coefficients

to improve the accuracy of the power transfer function",

claim 7 "deriving, for each group of at least one input, an impulse response function

between the signals and the power consumption; deriving a model for each group from

the impulse response function derived for that group",

claims 11 and 13 "deriving a second power transfer function for providing an estimate of

power consumption of the second circuit responsive to signals applied to the plurality of

inputs of the second circuit, wherein the second power transfer function includes a

portion for each group of the groups of the second circuit",

and claim 31 "deriving at least one power impulse function from the information",

in combination with the remaining elements and features of the claimed invention. Also,

there is no motivation to combine none of the references to meet these limitations. It is

for these reasons that applicant's invention defines over the prior art of record.

30.   As allowable subject matter has been indicated, applicant's reply must either

comply with all formal requirements or specifically traverse each requirement not

complied with. See 37 CFR 1.111(b) and MPEP § 707.07(a).

Response to Arguments

31.   Applicant's arguments filed 4/13/07 have been fully considered but they are not

persuasive.

32.   Regarding the specification objections, the amendment corrected all deficiencies

and the objections are withdrawn.

33.   Regarding the rejections under 112, Applicant's arguments have been

considered and the rejections are withdrawn.

34.   Regarding the claim objections, the amendment corrected all deficiencies and

the objections are withdrawn.

35.   Regarding the rejection under 103. Applicant's arguments have been considered,

but they are not persuasive.

36.   Applicant argues, (see page 11, paragraph 3 to page 11, paragraph 6), that

Uchino and Macii, either alone or in combination, fail to teach "grouping the plurality of

inputs into groups of at least one input based on a commonality of power consumption

of the circuit for the plurality of inputs as determined from the information".

37.   Uchino discloses grouping the plurality of inputs into groups of at least one input

based on a commonality (see "groups of the primary inputs in order that the primary

inputs having correlations to each other belong to the same group" col. 10, lines 44–50).

38.   Macii discloses grouping the plurality of inputs based on a commonality of power

consumption of the circuit for the plurality of inputs as determined from the information

(see "grouping the plurality of inputs" as "identifying the components of the original

stream" and "based on a commonality of power consumption ... for the plurality of

inputs" as "that are most relevant in characterizing average power consumption" and

"spatio–temporal and transition correlations captured from the original sequence" in

page 417, col. 2, next to last paragraph, lines 1–3 and 7–10).

39.   Examiner notes that Macii does not expressly elaborate on "spatio–temporal and

transition correlations captured from the original sequence", in page 417, col. 2, next to

last paragraph, lines 7–10. (See Macii "we do not discuss how the computation of the

pairwise correlation measures is done, since the subject has been illustrated elsewhere

(e.g., [12], [2], and [13])" page 419, 2nd paragraph, lines 4–7). Macii's reference [12] is

Marculescu et al., (Marculescu hereinafter) Switching Activity Analysis Considering

Spatio–temporal Correlations. Examiner would like to point out that commonalities of

power consumption for inputs were well known at the time the invention was made in

the analogous art of Marculescu (See "Spatial correlations ... Pattern dependencies,

that is, normally independent signal lines that become correlated due to a particular

sequence of inputs" in page 295, col. 2, Section 2.2, paragraphs 1–3).

40.   Applicant argues, (see page 11, paragraph 7 to page 12, paragraph 1), that Macii

teaches "reducing an input trace signal to a shorter signal that is inputted into a

simulated circuit to reduce computation time". Examiner agrees. Examiner relies upon

Macii to qualify Uchino's grouping.

41.   Therefore it is the Examiner's position that the cited references anticipate the

independent claims and the rejections are maintained.

Conclusion

42.   **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time

policy as set forth in 37 CFR 1.136(a).

43.   A shortened statutory period for reply to this final action is set to expire THREE

MONTHS from the mailing date of this action. In the event a first reply is filed within

TWO MONTHS of the mailing date of this final action and the advisory action is not

mailed until after the end of the THREE-MONTH shortened statutory period, then the

shortened statutory period will expire on the date the advisory action is mailed, and any

extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later

than SIX MONTHS from the mailing date of this final action.

44.   Examiner would like to point out that any reference to specific figures, columns

and lines should not be considered limiting in any way, the entire reference is

considered to provide disclosure relating to the claimed invention.

45.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Juan C. Ochoa whose telephone number is (571) 272-

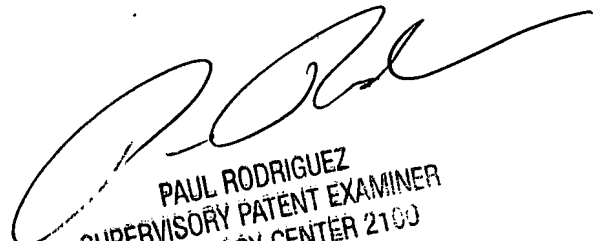2625. The examiner can normally be reached on 7:30AM - 4:00 PM.

46.   If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Paul Rodriguez can be reached on (571) 272-3753. The fax phone number

for the organization where this application or proceeding is assigned is 571-273-8300.

47.   Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

***   6/20/07

PAUL RODRIGUEZ
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100